

REMARKS

The Examiner is thanked for the performance of a thorough search.

Claims 23, 37, and 38 have been amended. Claims 25 have been cancelled. Hence, Claims 23-24, 26-29 and 37-39 are pending in this application.

THE PENDING CLAIMS SATISFY 35 U.S.C. § 112

Claim 38 was rejected under 35 U.S.C. § 112 as being indefinite. Claim 38 has been amended to overcome this rejection. Applicants submit that current Claim 38 satisfies § 112.

THE PENDING CLAIMS ARE PATENTABLE OVER THE CITED ART

Rejections under 35 U.S.C. § 102(b)

Claims 23, 29 and 37-39 were rejected under 35 U.S.C. § 102(b) over U.S. Patent 6,324,533 (hereinafter "*Agrawal*").

Applicants respectfully submit that the pending claims are patentable over *Agrawal*. To anticipate a claim, a cited reference must teach every element of the claim. MPEP § 2131. As shall be explained below, each pending claim recites at least one feature that is not disclosed, taught, or suggested by *Agrawal*.

Independent Claim 23 recites, with emphasis added:

A method comprising performing a machine-executed operation involving instructions, wherein the machine-executed operation is at least one of:

- A) sending said instructions over transmission media;
- B) receiving said instructions over transmission media;
- C) storing said instructions onto a machine-readable storage medium; and
- D) executing the instructions;

wherein said instructions are instructions which, when executed by one or more processors, cause the performance of a frequent itemset operation by performing the steps of:

dynamically selecting which occurrence counting technique to use from a plurality of available occurrence counting techniques by performing the steps of:
generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost of using the available occurrence counting technique,
wherein generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost comprises:
determining a size of a candidate prefix tree;
determining an amount of memory that can be used for the candidate prefix tree;
comparing the size of the candidate prefix tree to the amount of memory that can be used to store the candidate prefix tree; and
generating an I/O cost estimate for a prefix tree technique based, at least in part, on the size of the candidate prefix tree and the amount of memory that can be used to store the candidate prefix tree
and
selecting the occurrence counting technique that has the lowest estimated cost; and
during said frequent itemset operation, using said selected occurrence counting technique to count occurrences of at least one combination to determine whether said at least one combination satisfies frequency criteria associated with said frequent itemset operation.

The steps in Claim 23 which are emphasized above are not taught, suggested, or disclosed in *Agrawal*. First, the Office Action acknowledged that *Agrawal* does not disclose the prefix tree technique. Therefore, *Agrawal* cannot disclose, teach, or suggest the steps emphasized above.

Although the Office Action cited Grahne and Shu, “High Performance Mining of Maximal Frequent Itemsets” (hereinafter “*Grahne*”) as disclosing the prefix tree technique in general, *Grahne* does not disclose “generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost” that is “based, at least in part, on the size of the candidate prefix tree and the amount of memory that can be used to store the

candidate prefix tree”, as recited in Claim 23. Therefore, the combination of *Grahne* and *Agrawal* also does not disclose, teach, or suggest the steps emphasized above.

As at least one element is not disclosed, taught, or suggested by *Grahne* or *Agrawal*, either individually or in combination, it is respectfully submitted that Claim 23 is patentable over the cited art and is in condition for allowance.

Claim 29 depends from Claim 23, and therefore, include all of the limitations of Claim 23. It is therefore respectfully submitted that Claim 29 is patentable over the cited art for at least the reasons set forth herein with respect to Claim 23.

Independent Claim 37 recites, with emphasis added:

A method comprising performing a machine-executed operation involving instructions, wherein the machine-executed operation is at least one of:

- A) sending said instructions over transmission media;
- B) receiving said instructions over transmission media;
- C) storing said instructions onto a machine-readable storage medium; and
- D) executing the instructions;

wherein said instructions are instructions which, when executed by one or more processors, cause the performance of a frequent itemset operation by performing the steps of:

dynamically selecting which occurrence counting technique to use from a plurality of available occurrence counting techniques based on conditions existing in a computing environment in which the frequent itemset operation is to be performed, wherein the conditions include workload of a computer system in which the frequent itemset operation is to be performed, and an amount of volatile memory available to store a candidate prefix tree; and

during said frequent itemset operation, using said selected occurrence counting technique to count occurrences of at least one combination to determine whether said at least one combination satisfies frequency criteria associated with said frequent itemset operation.

The elements in Claim 37 which are emphasized above are not taught, suggested, or disclosed in *Agrawal*. First, *Agrawal* does not disclose “dynamically selecting which occurrence counting technique to use ... based on **conditions existing in a computing environment** in which the

frequent itemset operation is to be performed.” (emphasis added) Although *Agrawal* discloses selecting an occurrence counting technique based on the “data characteristics” of an operation (*Agrawal* col. 11 ln. 37-40), these “data characteristics” have no relationship with existing conditions in a computing environment at the time the occurrence counting technique is selected. As such, selecting a technique based on the “data characteristics” of an operation does not disclose the step of disclose “dynamically selecting which occurrence counting technique to use ... based on conditions existing in a computing environment”. Consequently, *Agrawal* cannot and does not disclose the element recited in Claim 37 of “wherein the conditions include workload of a computer system in which the frequent itemset operation is to be performed, and an amount of volatile memory available to store a candidate prefix tree”.

As at least one element is not disclosed, taught, or suggested by *Agrawal*, it is respectfully submitted that Claim 37 is patentable over the cited art and is in condition for allowance.

Claims 38-39 depends from Claim 37, and therefore, include all of the limitations of Claim 37. It is therefore respectfully submitted that Claims 38-39 is patentable over the cited art for at least the reasons set forth herein with respect to Claim 37.

Rejections under 35 U.S.C. § 103(a)

Claims 24 and 26-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Agrawal* in view of *Grahne*.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to

combine reference teachings. Second, there must be a reasonable expectation of success.

Finally, the prior art reference (or references when combined) must teach or suggest all the claim features. MPEP § 2143.

As discussed above, *Agrawal* does not disclose at least the following emphasized elements in independent Claim 23:

**“wherein generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost comprises:
determining a size of a candidate prefix tree;
determining an amount of memory that can be used for the candidate prefix tree;
comparing the size of the candidate prefix tree to the amount of memory that can be used to store the candidate prefix tree; and
generating an I/O cost estimate for a prefix tree technique based, at least in part, on the size of the candidate prefix tree and the amount of memory that can be used to store the candidate prefix tree”**

Also discussed above, the disclosure of the prefix tree technique in *Grahne* does not cure the deficiencies of *Agrawal*. Although *Grahne* discloses the prefix tree technique in general, *Grahne* does not disclose “generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost” that is “based, at least in part, on the size of the candidate prefix tree and the amount of memory that can be used to store the candidate prefix tree”.

Since the *Agrawal* and *Grahne* references, when combined, do not teach or suggest all the claim features in independent Claim 23, Claims 24 and 26-28, which depend from Claim 23, would not have been obvious from *Agrawal* in light of *Grahne* at the time of Applicants’ invention.

REMAINING CLAIMS

The pending claims not discussed so far are dependant claims that depend on an independent claim that is discussed above. Because each of the dependant claims includes the features of claims upon which they depend, the dependant claims are patentable for at least those reasons the claims upon which the dependant claims depend are patentable. Removal of the rejections with respect to the dependant claims and allowance of the dependant claims is respectfully requested. In addition, the dependent claims introduce additional features that independently render them patentable. Due to the fundamental difference already identified, a separate discussion of those features is not included at this time.

For the reasons set forth above, Applicant respectfully submits that all pending claims are patentable over the art of record, including the art cited but not applied.

CONCLUSION

It is respectfully submitted that all of the pending claims are in condition for allowance and the issuance of a notice of allowance is respectfully requested. If there are any additional charges, please charge them to Deposit Account No. 50-1302.

The Examiner is invited to contact the undersigned by telephone if the Examiner believes that such contact would be helpful in furthering the prosecution of this application.

Respectfully submitted,
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